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COUNTRY	USSR	REPORT	
SUBJECT	Crop Diseases and Insects in the USSR	DATE DISTR.	18 October 1962 50X1-HUM
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THIS IS UNEVALUATED INFORMATION.

1. A nine-page report on crop diseases and insects in the USSR

2. This report contains sections dealing with diseases and insects which damage agricultural products, extermination measures of these insects and diseases, prevention measures against them, and a detailed description of black stem rust.

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1. The annual rate of blight and insect damages of agricultural products in the Soviet Union varied in accordance with various factors such as the kinds of crops, types of blights and insects, weather conditions and other, but an average annual damage rate caused by blights and insects was estimated at approximately 15 percent. Especially, the damage by such insects as autumn night-moths and grasshoppers was enormous, once they assailed fields. In addition, such international quarantine targets as Colorado potato beetle and Hyphantria Cunea D were spreading in some areas of the USSR. The following are the most prevalent diseases and insects causing considerable damages to agricultural plants in the USSR:

A. Wheat and Barley:

1) Diseases: Stem rust (red, yellow, black), Snow blight, Stripe disease, Smut (loose, flag), Mosaic (virus), Powdery mildew, Speckled leaf blotch.

2) Insects: Wireworm, Soy bean beetle, Anguimois grain moth, Hessian fly.

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Disposition:

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B. Corn:

1) Diseases: Smut, Ramulispora leaf spot, Mosaic disease, Dry rot.

2) Insects: European corn borer, wireworm, Army worm (only in far east), Soy bean beetle.

C. Paddy-Rice:

1) Diseases: Rice blast, Bakanae disease, Dwarf disease (or stunt), Smut.

2) Insects: Planthoppers, Leafhoppers, Rice leaf beetle, Rice leaf miner, Rice stem borer, Rice plant weevil, Mole cricket (while the plant is young).

D. Dry Field Rice:

1) Diseases: Rice blast, Bacterial leaf blight, False smut.

2) Insects: Wireworm, Soy bean beetle, Mole cricket, Rice leaf miner, Barley flea beetle.

E. Potatoes:

1) Diseases: Late blight, Early blight, Bacterial wilt (or Brown rot), Soft rot, ~~Ringrot~~ Ring rot.

2) Insects: Colorado beetle, 28-spotted lady beetle, wireworm.

F. Sugar Beet:

1) Diseases: Cercospora leaf spot, Root rot, Root knot.

2) Insects: Cabbage armyworm, Beet tortoise beetle, Spotted cutworm, Beet nematode.

G. Tobacco:

1) Diseases: Bacterial wilt, Common tobacco mosaic, Black shank, Sclerotinia stem rot.

2) Insects: Oriental tobacco budworm, Soy bean beetle, Tobacco beetle, Tobacco trips.

H. Cotton:

1) Diseases: Angular spot, Wilt (or Black heart), Anthracnose (or pink boll rot).

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2) Insects: Cotton aphid, European red mite, Cotton leaf roller, Red seed worm (or Pectinophora Gossypiella)(this began to spread in the southern area of the Soviet Union in 1930's, but not so prevalent at present.)

I. Flax:

1) Diseases: Wilt (or flax sick), Anthracnose (or seedling blight), Rust.

2) Insects: Cabbage armyworm, Castaneous garden beetle, spotted cutworm.

J. Hemp:

1) Diseases: Bacterial blight, Canker, Gray mould.

2) Insects: Cabbage armyworm, European corn borer, Hemp weevil, Longicorn beetle.

K. Ambari Hemp:

1) Diseases: Ring spot, Anthracnose, Die back.

2) Insects: Mole cricket, European corn borer.

L. Hop:

1) Diseases: Downy mildew, Crown gall

2) Insects: Two-spotted red spider, Hop flea.

M. Fruits:

1) Diseases: Scab, Rust, Black spot, Blotch, Fruit spot, Powdery mildew, Black rot, Bitter rot (or Anthracnose), Canker, Fire Blight, Bird's eye rot, Ripe rot, Downy mildew, Dead arm.

2) Insects: Apple fruit moth, San Jose scale, Ruby scale, and other scales, Leaf roller, Wooly apple aphid, Tent caterpillar, Apple leaf worm, Longicorn beetles, Apple blossom weevil, Apple aphid, Grape phylloxera.

N. Tomato:

1) Diseases: Bacterial wilt, Soft rot, Mosaic disease.

2) Insects: Winter cherry bug.

O. Cabbage:

1) Diseases: Black rot, Black leg.

2) Insects: Cabbage sawfly, Common cabbage worm.

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P. Mulberry Tree:

1) Diseases: Die-back, White root rot, Twig blight.

2) Insects: Trips, Mulberry flea, Mulberry leaf roller, Measure worm, Mulberry small weevil, Mulberry borer, Mulberry yellowtail moth, Mulberry scale, Mealy bugs.

Plant Diseases and Insects Extermination Measures:

2. In the Soviet Union the following methods were employed in order to exterminate crop diseases and harmful insects:

A. Prevention Measures:

Efforts were made to prevent or minimize the damage of agricultural plants by diseases or insects by employing various agricultural techniques, such as the selection of strong breeds and favorable soil, the timing of sowing and transplanting, the adjustment in fertilizer, the rotation of crops, the quarantine measures, and the use of disinfectant.

B. Biological Extermination Measures:

Efforts were made for the protection and cultivation of natural enemies, such as birds, insectivorous and carnivorous insects, insectivorous plants, parasitic germs, and parasitic bees. In the Soviet Union, many kinds of parasitic bees including Aperinas living on wooly apple aphid and Trihogram living on various scales were cultivated and distributed to rural areas.

C. Physical and Mechanical Extermination Measures:

1) Catching: Caught insects by hands or simple instruments by exploiting insects' habits.

2) Traps: In accordance with the habits of various kinds of insects, the light traps, bait traps, and/or nest traps were utilized.

D. Chemical Extermination Measures:

The chemicals were most widely utilized in extermination of crop diseases and insects. In accordance with their uses, they were classified into germicide, insecticide, rodenticide, herbicide,

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bird-killer, and plant growth ~~ex~~ accelerant.

1) Germicide: Inorganic compound - coppery preparation such as Bordeau mixture, zineb, ferbam; and organic compound such as formalin.

2) Germ-insecticide: Sulphur-lime compound, sulphur powder, and fumigants such as chloropirin and carbon disulphide.

3) Insecticide: Catalyzers - machine oil preparation, oil emulsion, nicotine sulphate, Anabazin sulphate (peculiar to Turkestan, USSR), DDT, BHC; and poisons - arsenate, calcium arsenate, arsenious acid, bluoride, cyanamide.

4) Herbicide: 2.4 D, Potassium chlorate.

5) Other: Parathion, systox.

Plant Disease and Insect Damages Prevention Measures:

3. In order to prevent the outbreak of blight and insect damages, the presumption and forecast were conducted and quarantine measures were employed for all plants and crops getting into and out of the country.

A. Presumption and Forecast:

In the Soviet Union, the presumption of blight and insect damages were conducted in order to forecast the outbreak of diseases, so as to caution farmers to intensify early prevention measures. The forecast was classified into two types, i.e., the long-term forecast and the short-term forecast. The former predicted the possible occurance of blight and insect damages during the year and it was judged from the weather characteristics and other conditions during the ~~p~~ spring of the year and the preceding winter as well as the damage rates versus weather and other conditions in the preceding five to ten years. The latter forecast the imminent outbreak of blights and impending spread of insects. In the Soviet Union, there were many professional presumption and forecast stations of the kind in accordance with the peculiarities of each area. In Kazak Republic only, there were seven presumption and forecast stations.

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B. Quarantine Activities:

In the Soviet Union the quarantine activities were carried out in two different phases: One was external quarantine to prevent blights and insects from being imported from foreign countries, and the other was the internal quarantine to prevent existing blights and insects from spreading within and without the country. Therefore, all vegetable materials being imported or exported were closely inspected at ports, border-crossing roads and railroads, airports, as well as the post offices dealing with international parcels. In addition, the movement of any vegetable materials out of the infected areas was prohibited by law and concentrated disinfection and extermination activities were carried out in those areas.

Black Stem Rust in the Soviet Union

4. The black stem rust is one of the most prevalent plant diseases in the Soviet Union and its damage rate is an average of 20 percent and sometimes reaches as high as 50 percent in the worst case. The infection of the disease usually starts in late May and its primary hosts are wheat, barley, rye, and oats. The pathogenic organ of the black stem rust (or Puccinia Graminis P) is fungi and its taxological status is as follows:

Fungi

Basidiomycetes

Hemibasidii

Uredinales

Pucciniaceae

Puccinia Graminis

A. Characteristics of Pathogenic Organ:

As shown in the above, the pathogenic fungus of the black stem rust belongs to Basidiomycetes and breaks into the body of the plant, wandering between cells. Appearing thready, it is called a filamentous fungus. It measures about four to five microns. Having no chlorophyll, this fungus cannot conduct carbon assimilation, and therefore, it nourishes and multiplies by living in other organism. In this case,

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the organism on which the fungus lives falls ill. The fungus is a regular spore-type and its mycelium branches off into basidium which forms basidiospore, or sporidium. That is, chlamydospore or teleutospore buds to have promycelium, and sporidium or basidiospore forms on its sterigma. The number of sporidium is indefinite. The types of ~~this fungus~~ spores of this fungus were broken down as follows: spermatium, aecidiospore, uredospore, and teleutospore. The fungus hibernates in the damaged plants in the form of teleutospore, and then becomes parasitic on the secondary host, i.e., barberry trees (or berberis thunbergii) where it forms spermatium and ~~and~~ aecidiospore. Spermatium and aecidiospore later scatter in the wind and stick to wheat and barley in which uredospore and teleutospore are again formed.

B. Development of Fungi:

The fungi spread by the wind and break in between stoma of the plant. Once the mycelium sticks to stoma, an adhesive organ develops and the infected area of the plant swells up. Then the mycelium produces boring mycelium which breaks into the air chamber of the plant and makes it baggy. Here ~~they~~ the regular mycelium is formed and spread in the body of the plant. As mentioned in the above, however, the mycelium lives in between cells and does not get into the cell itself but thrust ~~its~~ it absorbent into it to imbibe nourishment. The first genesis body of the fungus is mainly uredospore, whose germination temperature is 20 to 22 degrees C and germiniation period is about 20 hours. The incubation period from the time of the adhesion of the fungi up to when the symptoms first develop is believed to be five to ten days. The fungi usually attack leaves, sheaths, stems and ears. The areas of the plant attacked by uredospore have rather large, lengthy, and oval spots, and those ~~by~~ attacked by teleutospore bear dark stripes.

C. Fighting Measures:

1) Very much importance was placed on the research for immunity of agricultural plants in the Soviet Union. An immunity research

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office was permanently established under the Leningrad Plant Protection Research Station, and many scholars were mobilized for the scientific research in this field. That is, efforts were concentrated on cultivating new breeds whose protoplasm had little affinity with germination. As of 1953, Soviet scientists had succeeded in cultivating a new breed which had a strong resistance against Puccinia Graminis. However, the new breed was said to be neither cultivable in all areas of the Soviet Union nor as productive as the native breed. In other words, the research on immunity had not yet been completely successful, and the said new breed was cultivated only in the areas having suffered very much damage from black stem rust, taking its less productiveness into consideration. In parallel with the immunity research, the standardized method of evaluating the resistance of all agricultural plants against all botanical diseases was stipulated by the regulations ~~of the Plant~~ issued by the Plant Protection and Quarantine General Bureau of the Agriculture Ministry, USSR. The standardized method included the time of examination, developing stages of diseases, methods of examination, etc.

2) Various measures were taken to get rid of the secondary host plants of the fungi of black stem rust. In the Soviet Union, its secondary host was known as Berberis Thunbergii.

3) Infected plants were separately disposed of. (Since the fungi spread in the wind, the disposition of infected plants was very important, but it appeared that the Soviet Union had not yet found any perfect way of disposing them.)

4) As biological measures, the researches in antagonistic germs, biophage, and antibiotics were under way, but no remarkable result has yet been obtained.

5) Nitrogenous fertilizer had to be used with great care because its excessive use made plants vulnerable to black stem rust. If nitrogenous fertilizer is excessively used, the exterior skin of wheat becomes more smooth, less hairy, and less waxy; its cells

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have less sclerenchyma and the spaces among them are wide; and its leaves are more stomate and sappy. On the contrary, the plants with less nitrogenous substance are less stomate, have more sclerenchyma, and the spaces among its cells are narrow. Generally, wheat with well-developed sclerenchyma is less susceptible to black stem rust and that with more collenchyma and sclerenchyma are more susceptible to the said disease.

6) Before or in the first stage of the attack of the disease, a 1 in 40 lime sulphur, or wettable sulphur, is used at the rate of 180 to 200 litters per hectare,or sulphuric powder is used at the rate of 20 to 30 kilograms per hectare. However, these chemicals are not very effective.

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